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U 013457-4

WHAT IS CLAIMED IS:

CLAIMS

1. A method for determining a ^{SV (x)} (state variable x) from at least ^{SV} (one sensor value) by a ^{CF} (cost function) prepared for ^{mv (y)} (a measurement value y) for use in ^{AV} (an arithmetic unit) of a sensor system having at least one sensor, wherein the cost function depends on ^{RS (x)} (the respective state x) to be measured and indicates ^d (deviation) of an ^{AMV} (actual measured value) from ^C (a calibration) as a function of the ^{S(x)} (state x) in order to determine from this minimum the ^{SS (x)} (sought state x) the improvement comprising:

^{→ who, what?} providing at least (one approximation function) based on (at least one approximation region within the state region x) to obtain (an approximation of the cost function) with approximation functions with negligible error, wherein the sums of the approximation regions cover (the entire relevant state region) and

$$\sum A_{region} = S_{region}$$

* determining all local minima ^{delete} on the basis of the approximation, at least in a selection of approximation regions,

which? factor or region?
interpret? 2
determine all lim. of an A region

2. The method of claim 1, comprising determining a global minimum from comparison of the local minima.

3. The method of claim 1, comprising determining all minima in each approximation region for determining the minimum of the cost function.

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4. The method of claim 1, wherein an approximation of the cost function is conducted, and, for determining the minimum of the cost function in a selection of appropriately established approximation regions, to obtain minima values in each approximation region, a determination of a local minimum value is made based on a quadratic approximation function, each local minimum value x is being determined in the neighborhood of a selected grid point, proceeding from a start vector x_0 and by the sum of the respective starting vector x_0 and a weighted difference of the measured value from a calibration value as a function of a start vector.

5. The method of claim 4 wherein the approximation functions and the neighborhoods are established so that the approximation function has only one minimum in the vicinity of the respective grid point and that the local minimum is determined by a gradient function.

6. The method of claim 1 wherein the approximation function has minima which can be determined by analytical methods.

7. The method of claim 1 wherein the at least one approximation function and the at least one approximation region are produced in a recursive procedure prior to establishing the

cost function.

8. A sensor system having at least one sensor (3) for detecting a system state and an arithmetic unit (4) associated, therewith said arithmetic unit (4) carrying out the method for determining a state variable from at least one sensor value according to claim 1.

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1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.